First record of the rotifer *Lecane shieli* Segers & Sanoamuang, 1994 from Australia

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ABSTRACT

The monogonont rotifer *Lecane shieli* is recorded for the first time from Australia (Bora Channel in the Macquarie Marshes, New South Wales: 30.65872° S /147.53144° E). Until recently, *L. shieli* was known only from Thailand, where the species was first described. This Australian record of a Thai 'endemic' is interesting in considering possible dispersal and biogeographical distribution.

Key words: zooplankton, monogonont rotifer, *Lecane shieli*, Macquarie Marshes, biodiversity, migratory waterbird

Wetland (or river-floodplain) systems provide important habitats for a variety of terrestrial and aquatic biota (Junk *et al*. 1989; Junk and Wantzen 2004 and references therein). An understanding of biodiversity and productivity in relation to water availability is important in ecological management of such systems. River and creek channels that run through the floodplains become an important conduit and refuge for aquatic biota in dry times (Junk and Wantzen 2004).

The Macquarie Marshes (total area: ~210,000 ha), in the north-west end of the Macquarie River catchment, form one of the largest floodplain wetlands in the Murray-Darling Basin of south-eastern Australia (Keith 2004). The Marshes comprise a mosaic of inland floodplain swamps, shrub lands, and woodlands as well as inland riverine forests (Keith 2004), and provide an important habitat for many waterbirds including colonially-nesting waterbirds (Kingsford and Thomas 1995; Kingsford and Auld 2005). The Macquarie Marshes Nature Reserve was listed as an internationally significant wetland under the Ramsar Convention in 1986 (Kingsford and Thomas 1995). Because of extended droughts exacerbated by regulation/extraction of the Macquarie River that supplies the Marshes, the presence of aquatic biota in the Marshes is confined primarily to river and creek channels where there is water.

As part of an ecological study of the Macquarie Marshes, zooplankton samples were collected in November 2006. Here we report the first record of the monogonont rotifer *Lecane shieli* from Australia. The specimen was found in a sample collected from Bora Channel in the Macquarie Marshes.

Methods

Sampling was conducted between 7 and 10 November 2006 at multiple sites along the Macquarie River, Monkeygar Creek and Bora Channel that run through the Macquarie Marshes from the southern to the northern end (Fig. 1). Duplicate water samples (10 L each) were collected at each site by submerging a plastic container in the mid channel. Zooplankton samples were concentrated by filtering through a 35 μm mesh sieve, and preserved in a 4% buffered formaldehyde solution. In the laboratory, zooplankton specimens were examined and identified (Segers 1995; Shiel 1995) under a Leica Diaplan compound microscope at a magnification of ×100 to ×320, with an image analysis system consisting of Leica DFC480 digital camera and Leica IM Version 4.0 digital imaging software (Leica Microsystems, Germany). In the field, water temperature and dissolved oxygen were measured using a YSI Model 5100 Dissolved Oxygen/Temperature Meter (YSI Inc., Ohio, USA). Duplicate water samples were also collected for measurements of conductivity (ORION Model 160 conductivity meter, Orion Research Inc., Massachusetts, USA) and turbidity (HACH 2100AN turbidimeter, Hach Company, Colorado, USA), and for analysis of nutrients in the laboratory. Nutrient analysis methods followed Greenberg *et al.* (2005).

Lecane shieli Segers & Sanoamuang, 1994

A single parthenogenetic female specimen of *Lecane shieli* was found in the sample collected on 10 November 2006 from Bora Channel of the Macquarie Marshes within the Northern Nature Reserve (30.65872° S/147.53144° E) (Figs. 2 and 3). The morphological characteristics of the specimen accord with descriptions by Segers and

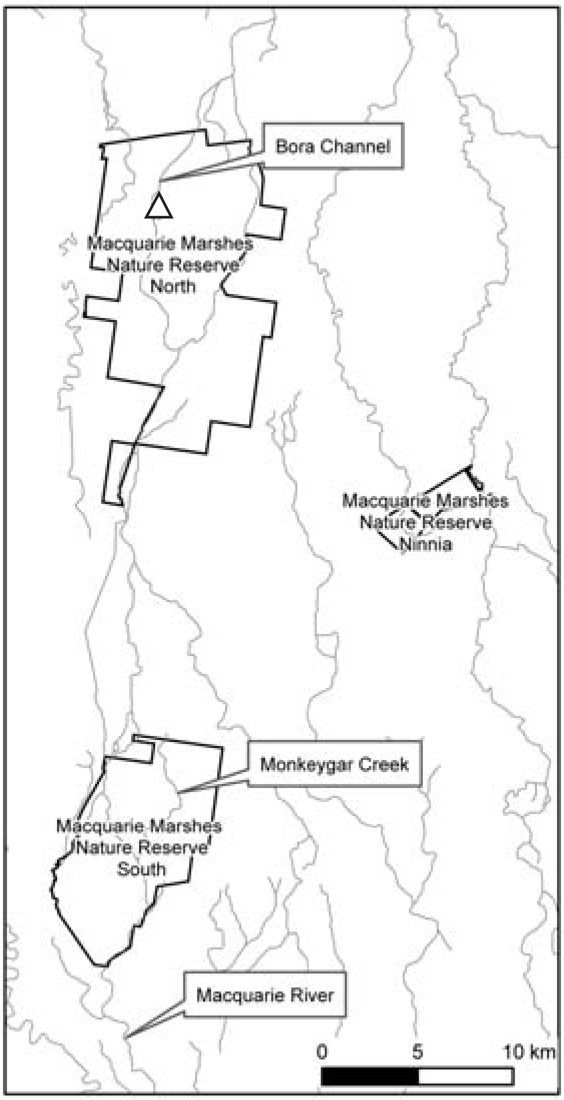
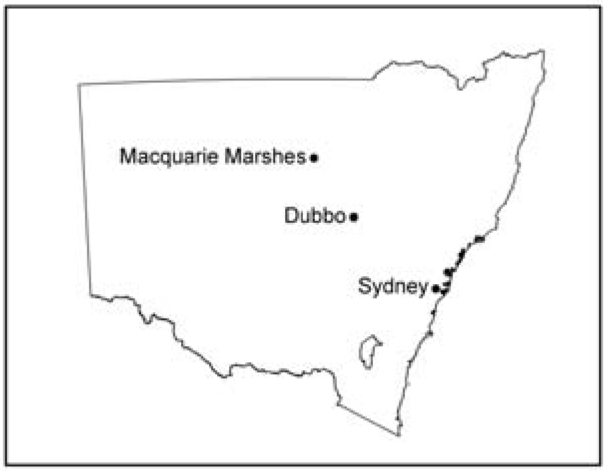

Bora Channel
Macquarie Marshes Nature Reserve North
Macquarie Marshes Nature Reserve Ninnia
Monkeygar Creek
Macquarie Marshes Nature Reserve South
Macquarie River
0
5
10 km

Figure 1. Location of Macquarie Marshes and the sampling site on Bora Channel from which *Lecane shieli* was collected △.

Sanoamuang (1994). Physico-chemical conditions of the Bora Channel water were: water temperature at 0745 and 1800 hrs: 18.7 and 27.3 °C; dissolved oxygen: 5.9-6.0 mg L^{-1}; conductivity: 514-515 µS cm^{-1}; turbidity: 8.3-8.6 NTU; total N: 980-1329 µg L^{-1}; oxidized N: 1.8-2.0 µg L^{-1}; ammonia N: 5.5-6.3 µg L^{-1}; total P: 158-216 µg L^{-1}; and filterable reactive P: 95.1-95.4 µg L^{-1}.

The rotifer *Lecane shieli* was originally recorded and described from Thailand but never recorded elsewhere. *Lecane shieli* now occurs in Turkey (Altindag *et al.*, pers. comm., 2007) and appears to live in southern and northern hemispheres. The species occurs in various freshwater habitats including a floodplain wetland in Thailand, with warm-water preference (Segers and Sanoamuang 1994; Savatenalinton and Segers 2005; L. Sanoamuang, pers. comm. 2007, Khon Kaen University, Thailand). Its habitats have conductivity reported in the range of 85 – 515 µS cm^{-1}, and water temperature up to 27 °C (Segers and Sanoamuang 1994 and present study).

Several rotifer species (e.g. *Brachionus kostei*, *B. lyratus* and *Lecane batillifer*) that were previously considered endemic to Australia also occur in Thailand (Sanoamuang 1998). This first Australian record of


Macquarie Marshes
Dubbo
Sydney

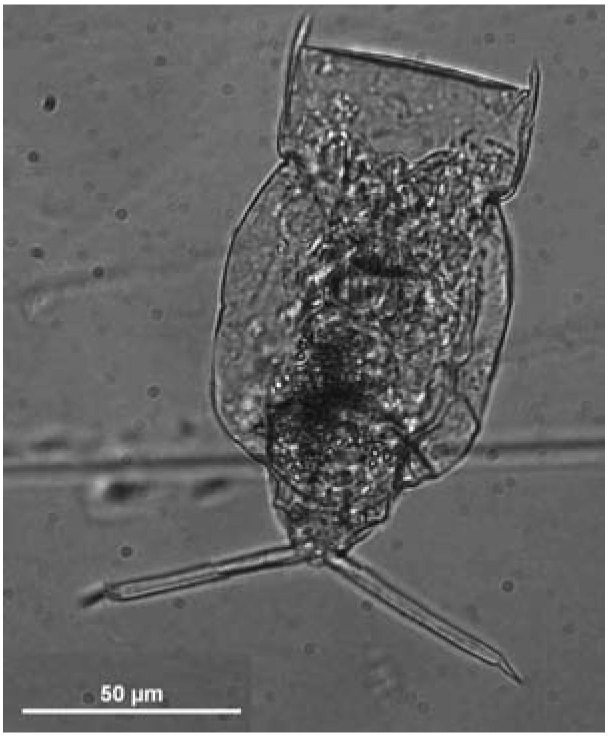


Figure 2. Photomicrograph of *Lecane shieli* collected from Bora Channel in Macquarie Marshes.

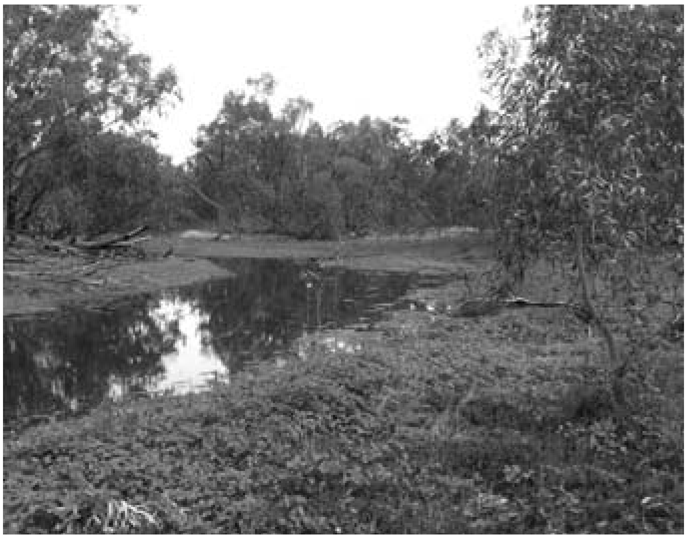


Figure 3. Sampling site on Bora Channel from which *Lecane shieli* was collected. View towards upstream.

Lecane shieli raises intriguing questions about possible dispersal and biogeographical distribution. Migratory waterbirds may be important potential vectors of microfauna (Santamaría and Klaassen 2002; Green and Figuerola 2005). Movements of wild birds into Australia from Asia occur every year with migratory shorebirds arriving in spring (Tracey *et al.* 2004). The Macquarie Marshes are used intermittently by at least ten species of migratory shorebirds (Kingsford and Thomas 1995). Five of them (Greenshank *Tringa nebularis*, Marsh Sandpiper *Tringa stagnatilis*, Red-necked Stint *Calidris ruficollis*, Black-tailed Godwit *Limosa limosa* and Bar-tailed Godwit *Limnosa lapponica*) occur in Thailand (Li and Mundkur 2007, pp.106-107). Aquatic invertebrates including rotifers can be transported in the gut of waterbirds, or on their feet and feathers (Frisch *et al.* in press). A recent study by Green *et al.* (in press) showed that three rotifer taxa (*Brachinous* sp., *Cephalodella* sp. and bdelloid) emerged from droppings of nomadic waterbirds (Eurasian Coot *Fulica atra* and Black Swan *Cygnus atratus*) in the Macquarie Marshes. This type of microfauna dispersal mechanism could explain the occurrence of zooplankton in the Macquarie Marshes with close affinity with south-east Asia.

Acknowledgments

We thank Jeff Kelleway, Tim Ralph and Debashish Mazmuder (Australian Nuclear Science & Technology Organisation) for help in field work; Ray Jones, Bill Johnson and Neil Saintilan for logistic support; Richard Kingsford (University of NSW), Jennifer Spencer, Rachael Thomas, Stuart Halse (Bennelongia P/L), Daniel Lunney, Renee Shepherd and Paul Rendell for useful suggestions and comments. Thanks are offered to Shannon Simpson for producing figure 1; Jeff Kelleway for providing a photograph of the sampling site (figure 3); and Ed Czobik for conducting nutrient analyses. This work was funded by the NSW Wetland Recovery Program, which is jointly funded by the NSW Government and the Australian Government's Water Smart Australia programme, and is delivered in partnership by the DECC and the Department of Water and Energy, in association with the Central West and Border Rivers-Gwydir Catchment Management Authority.

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